

EXHIBIT 1"

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Exhibit 1 - Topics Related to Dr. Marc Rysman's Opinions

The following are the positions of Dr. Rysman and Dr. Leonard on the agreed upon issues to be addressed at the concurrent expert witness proceeding to be held on August 1, 2023:

1. What Dr. Rysman's Model Calculates

Dr. Rysman's Position

Dr. Rysman's model calculates the consumer welfare loss from: (1) higher prices for apps and in-app content and (2) the decrease in the number of new apps published on the Google Play Store that resulted from Google's supracompetitive commission rate and restrained level of Play Points awarded to consumers. Dr. Rysman's model has three outputs: (1) a direct price effect, (2) a variety effect, and (3) a combined effect that allows prices and variety to interact. The disputed issues in this document focus on the variety effect. The variety effect shows that, even assuming no pass-through, consumers were harmed by the decreased innovation, choice, and entry of paid apps and in-app content.

The variety of apps available on an app store is an important objective measure of the quality of the store and is an important determinant of the level of consumer surplus derived from transactions made on the store. At the 15% benchmark commission rate Dr. Rysman proposes, more paid apps and in-app content would have been available for consumers to download because higher profits to developers would have generated greater app entry.

Dr. Rysman's model is based on peer-reviewed economics papers such as Jeffrey Church & Neil Gandal, *Complementary Network Externalities and Technological Adoption*, published in the International Journal of Industrial Organization in 1993, and Avinash K. Dixit & Joseph E. Stiglitz, *Monopolistic Competition and Optimum Product Diversity*, published in the American Economic Review in 1977. Dr. Rysman's model predicts that Play Store customers that made purchases during the damages period in the aggregate would have re-allocated their budgets across the greater variety of content in the but-for world. Using standard economic tools, such as the monopolistic competition model of Dixit & Stiglitz (1977), a foundational paper in the field, Dr. Rysman estimates the level of variety that would have been provided and the additional utility these consumers would have received on these purchases as a result of that increased variety. He then uses the concept of equivalent variation from the economics literature, another standard tool in economics, to convert that added utility into a dollar amount. Here, equivalent variation calculates the amount of money it would take to put consumers in the position they would have been in had they made purchases in a but-for world with greater app variety.

The increase in consumer welfare from the greater app variety in the but-for world is akin to a variety-adjusted price, as shown in the following example. Suppose a Play Store consumer

spends \$10 on in-app purchases but is willing to pay \$20 for those downloads. The difference between what the consumer pays and what the consumer is willing to pay (pictured as the difference between price and demand in a standard economic graph) is known in economics as consumer surplus. In this example, the consumer surplus is \$10, which is the difference between the \$20 valuation and the \$10 price. In the but-for world, there is greater app variety, and the consumer can change their mix of purchases to a value-maximizing combination that includes the new variety. Suppose, with this new variety, the consumer still spends \$10 but allocates it to realize \$30 of value, leading to a consumer surplus of \$20. Suppose that in the actual world, the consumer would have to spend \$15 to obtain \$20 of surplus. Receiving \$10 of surplus rather than \$20 is equivalent to the monopolist raising the variety-adjusted price from \$10 to \$15. Thus, the consumer is harmed even if their out-of-pocket spending is the same between the actual world and but-for world. These simple hypothetical figures are for illustration purposes only; in the model, the aggregate consumer surplus increase in the but-for world derives from the billions of actual-world transactions in the data.

As Dr. Leonard points out below, Dr. Rysman testified at his deposition that his model calculates how much more ““happiness” ... consumers would have experienced if developers launched more Android apps in a world where Google charged lower service fees.” But Dr. Leonard is incorrect to stop there: By “happiness,” Dr. Rysman is referring to the economic concept of “utility,” and, as explained above, his model converts this “utility” into a dollar amount by measuring the equivalent variation for consumers that made purchases on the Play Store during the damages period. Dr. Rysman calculates damages only for consumers that made purchases on the Play Store during the damages period; he does not include consumers that made no purchases on the Play Store or purchases made on other stores. And Dr. Leonard’s quotation to Stiglitz (2017) is taken out of context; it is directed at claims that a market “is in some sense constrained Pareto efficient,” which Dr. Rysman does not claim.

Dr. Leonard’s Position

Dr. Rysman’s model is not grounded in economics. Dr. Rysman’s entire model depends on the assumption that whether an app is successful is *completely unpredictable*. That assumption leads Dr. Rysman to treat every app in the actual world as “symmetrical” to every app that supposedly would have launched in the but-for world, with the exact same price, quantity of sales, marginal cost, entry cost, demand function, and quality (his “symmetry” assumption). Neither assumption is supported by economic literature. As discussed in greater detail below, Dr. Rysman’s complete unpredictability assumption is undermined by empirical evidence and the only paper he cites for that assumption. As for the “symmetry” assumption and the “foundational” Dixit & Stiglitz paper Dr. Rysman cites, Dr. Stiglitz himself explained that “welfare decreased” in situations where he eliminated the “symmetry” assumption Dr. Rysman makes here, which was “an important warning ...: *one has to be very careful about making*

welfare statements in trade, macroeconomic, and growth models using the Dixit–Stiglitz framework.” (emphasis added).¹

At his deposition, Dr. Rysman testified that his “app variety model is trying to calculate how much happier consumers would be if they had more variety of apps” and that his “model is not trying to calculate the actual dollars that consumers would have in their pocket if they had an additional app variety.” MDL Dkt. No. 484-4, Ex. 3 (Rysman Dep. Tr. at 81:22-82:1, 82:20-25). Assigning a dollar figure to that additional happiness through equivalent variation does not change what Dr. Rysman is calculating. Dr. Leonard agrees with Dr. Rysman that his app variety model is not calculating the additional money in consumers’ pockets from more app variety. After all, the model is built in a way that keeps the price and quality of the apps that would enter in the but-for world *exactly the same* as the apps that exist in the actual world. Therefore, it is just measuring the subjective preference of consumers from additional variety, not an objective measure like price and quality. Whether the damages that Dr. Rysman has calculated are available under the antitrust laws is a legal issue that is a proper subject for the Daubert motion hearing, not the concurrent expert proceeding. However, economists have not used models like Dr. Rysman’s to calculate actual damages or losses of money that consumers experienced. That is because doing so involves extremely complex and challenging issues with accounting for the enormous variety among apps and determining how the quality of apps that did not launch would compare to those that did. Rather than address these complex economic issues, Dr. Rysman’s model simply assumes that they do not exist, which is not an economic methodology at all. Indeed, the example in Plaintiffs’ submission confirms this. The submission does not explain why the apps that supposedly would have launched in this example would have increased the value to the consumer from \$20 to \$30. Dr. Rysman simply assumes that this would be the case because he assumes that the apps that would have launched would have provided more value than those that actually launched. He has no basis for this assumption.

2. Dr. Rysman’s Assumption that App Success is Unpredictable Before Entry

Dr. Rysman’s Position

Dr. Rysman’s model uses a “free entry” condition, which posits that firms enter a market if they expect entry to generate positive economic profits above fixed costs. Free entry is a standard assumption in models of “monopolistic competition”—a term in economics used to describe markets with many competitors whose products are still somewhat differentiated from one another. Among others, Church & Gandal (1993) and Dixit & Stiglitz (1977) use a free entry condition.

¹ J. Stiglitz, “Monopolistic competition, the Dixit-Stiglitz model, and economic analysis,” Research in Economics, 2017.

In modeling the market-wide entry in the but-for world at the competitive commission and subsidy levels, Dr. Rysman relies on the National Bureau of Economic Research working paper by Rebecca Janßen, Joel Waldfogel and others, *GDPR & The Lost Generation of Innovative Apps* (2022), which found that app success is unpredictable before an app launches on the Play Store. Janßen et al. demonstrate that the increased fixed costs of compliance imposed by the GDPR decreased the rate of entry of both successful apps *and* unsuccessful apps on the Play Store in equal proportions. That finding “provides strong evidence that app success is unpredictable, so that an entry reduction can deliver large welfare impacts.”² Based on this empirical evidence that app developers cannot accurately predict their level of success, Dr. Rysman models the apps available due to the increase in variety under the counterfactual 15% commission rate to be of the same average quality as under the monopoly rate Google charges in the actual world, rather than of a higher or lower quality.

Contrary to Dr. Leonard’s claims below, Janßen et al. did not conclude that app success is generally partially predictable. They are clear that their main result shows no predictability. While the paper also explores “the sensitivity of [the] results to alternative assumptions about . . . the predictability of app success at entry,”³ and some regression results “suggest partial predictability,” the authors found these results to be “fairly restrictive measures of success.”⁴ They therefore conclude that “their basic descriptive estimate provides reasonable evidence that app success is unpredictable.”⁵

Dr. Leonard’s Position

Dr. Rysman’s unpredictability assumption is not reliable because it contradicts the only economic support he cites for the assumption.

The only paper on which Dr. Rysman “bases” his complete unpredictability assumption is the unpublished paper *GDPR & The Lost Generation of Innovative Apps* by Janßen et al. The authors of that paper originally made Dr. Rysman’s assumption that app success is entirely unpredictable. However, the paper states that the authors’ statistical results “suggest partial predictability.”⁶ Because this “complicates the counterfactuals,” the paper’s authors revisited the unpredictability assumption and recalculated the effects of app entry by assuming partial predictability.⁷ They found that assuming complete unpredictability overstated the effects of

² Rebecca Janßen et al., *GDPR & the Lost Generation of Innovative Apps*, Nat’l Bureau of Econ. Res. Working Paper No. 30028 (May 2022), MDL ECF No. 484-7, at 22.

³ *Id.* at 30.

⁴ *Id.* at 22.

⁵ *Id.* at 32.

⁶ *Id.*

⁷ *Id.*

reduced app entry by “about half”.⁸ Dr. Rysman completely ignores this finding of the paper and instead blindly adopts the assumption that an app’s success is completely unpredictable, contrary to the paper’s empirical analysis. And the paper demonstrates the proper way an economist should respond when empirical data contradicts a predetermined assumption of complete unpredictability—he must test his results with a partial predictability assumption to see if it changes his conclusions. Dr. Rysman ignores this step and thus persists in making an assumption that contradicts the only economic study he has cited on the issue. That is not a reliable application of economic methods.

Thus, Dr. Rysman contradicts the only paper he relies upon for a fundamental assumption underlying his model. Indeed, his assumption that app success is completely unpredictable contradicts basic economic principles. Apps with higher quality have a higher predicted return on investment. Accordingly, the fact that developers and investors launched some apps but not others indicates that they believed that the apps they did launch were better and therefore more likely to succeed.

3. Dr. Rysman’s Assumption that Apps Have the Same Weighted Average Price, Marginal Cost, and Quality

Dr. Rysman’s Position

Dr. Rysman’s model assumes that apps have a common quality, marginal cost, and price. Those common characteristics are drawn from careful regressions and calculations using real-world data, including from the paid app and in-app transactions in the Play Store transaction data Google produced spanning the damages period. The substitutability between apps is governed by a single parameter—demand elasticity—taken from the academic literature and supported by extensive regression analysis in Dr. Rysman’s opening report.⁹ Modeling substitutability with a single parameter, and other symmetry assumptions, are standard approaches in economics to study monopolistically competitive markets. For example, Nair et al. (2004) use such a model to study apps on Personal Digital Assistant devices.¹⁰ Models like these are commonly used to analyze the effect of tariffs and taxes on a range of imports and products that enjoy a degree of market power, like apps do.

In both his opening and rebuttal reports, Dr. Rysman analyzes the robustness of these assumptions. He shows that his model closely approximates the outcomes that would result if

⁸ *Id.* at 33.

⁹ Rysman Opening Report, pp. 347-352.

¹⁰ Harikesh Nair, Pradeep Chintagunta, & Jean-Pierre Dube, *Empirical Analysis of Indirect Network Effects in the Market for Personal Digital Assistants*, 2 Quantitative Mkt’g & Econ. 23 (2004).

app quality and marginal costs—and, by extension, price—differed across apps. Moreover, the unpredictability of whether an app will be successful (discussed above) makes these variations less relevant for both existing and newly entering apps. While studying the heterogeneity of prices, costs, and quality in apps that would have become available only in the competitive but-for world would appear to be an intractable, retrospective exercise because Google foreclosed the entry of those apps, Janßen et al. use econometric techniques and the exogeneity of the GDPR to infer that these apps would have a quality distribution similar to apps that exist in the actual world.

Dr. Rysman’s model recognizes that apps with the same price and quality can provide variety benefits to consumers because products that appear to be similar can still be differentiated from each other in what they offer. Following the economics literature, Professor Rysman infers the level of differentiation from the price elasticity.

Dr. Leonard’s Position

Ironically, Dr. Rysman’s app variety model improperly assumes away variety among apps. Dr. Rysman constructs a model that purports to measure how much more “utility”—or “happiness,” see Dkt. No. 484-4, Ex. 3 (Rysman Dep. Tr. at 82:12-17)—consumers would have experienced if developers launched more Android apps in a world where Google charged lower service fees. Consumers only could have experienced more “happiness” if the additional choices provided by the new apps would have been useful to consumers in ways that the millions of apps already available in the real world were not. Thus, for an economic model to even attempt to measure the effect increased app variety has on consumer “happiness,” it must account for the variety of apps in the real world and compare it to the variety of apps that would have launched in the but-for world.

Dr. Rysman’s variety model fails this basic requirement. Rather than account for app variety, Dr. Rysman simply assumes it away. He assumes that all of the apps that supposedly would have launched are the same as the apps that actually did launch and that all Android apps—regardless of whether they entered the market in the actual world—have the same price, quantity of sales, marginal cost, entry cost, demand function, and quality (the so-called “symmetry assumption”). However, Dr. Rysman admitted at deposition that this symmetry assumption is not true in the real world. *See, e.g., id.* at 97:10-13, 97:20-98:8, 98:24-99:19. Indeed, data and evidence show that apps have different prices, sales, usage, marginal cost and quality. Because Dr. Rysman’s assumption that there is no app variety is clearly wrong, his app variety model cannot reliably calculate injury or damages from any loss of app variety. The papers Dr. Rysman cited in his report do not assume “symmetry.”

4. Calculation of Damages for Individuals

Dr. Leonard's Position

Dr. Rysman's app variety model ignores variety among apps. His model attempts to measure how much "happier" consumers would be in the aggregate if there were more Android apps. To do this, Dr. Rysman assumes that a "representative consumer" would purchase every Android app. However, in order to measure how much "happier" a real-world individual consumer would have been if there were more Android apps, one would have to know that consumer's individual preferences, including which apps each consumer values, why the consumer values those apps, which additional apps would have entered in a world without Google's challenged conduct and how much each consumer would value those new apps. Plaintiffs concede as much in their statement above, noting that it would be "virtually impossible for any economist to model each individual's preferences". Dr. Rysman did not offer a methodology for how he would achieve this and therefore did not offer any methodology for calculating individual injury or damages based on reduced app variety in his opening or rebuttal reports.

To the extent Dr. Rysman claims that he can calculate individual damages by simply apportioning his aggregate calculation of variety damages based on how much an individual spent on apps and IAPs (which was not set forth in his report), that approach is economically invalid and demonstrably unreliable. It makes no sense to assume that all consumers value increased app variety in exactly the same way in proportion to their consumer spend. For example, there is no reason to assume that a consumer who spent thousands of dollars on purchases involving one app suffers more in lost happiness from less app variety while a consumer who spent \$10 on purchases while downloading hundreds of different apps suffers much less. Dr. Rysman has provided absolutely no evidence – or even economic theory – for why a consumer's utility from more app variety would operate in this manner.

Dr. Rysman's reliance on the Eaton & Kortum paper illustrates how improper it is for him to use his model to calculate individual damages in this case. The Eaton & Kortum paper develops a "model of international trade." Even if it were appropriate to assume away product variety in modeling international trade, it is absurd to do so in trying to estimate individual damages from lost app variety on Android devices.

Dr. Rysman's Position

Dr. Rysman's model can supply a reasonable estimate of harm to individual consumers. As he testified at his deposition, this calculation takes the percentage increase in aggregate consumer welfare from increased variety and multiplies it by the individual's total spending on

the Play Store during the damages period. In the version of the model that assumes a 0% pass-through, Dr. Rysman calculates a 22% increase in total consumer welfare.

Dr. Rysman did not itemize the damages for each purchaser the States are representing in their suit, but his workpapers included in the backup production to his reports provide the data for calculating the multiplier using simple arithmetic as he explained at his deposition.¹¹ Contrary to Dr. Leonard's assertions, one need not know every individual "consumer's preferences" to reasonably approximate variety damages for individuals. Dr. Rysman chose a model of monopolistic competition with a constant elasticity of substitution because it would be virtually impossible for any economist to model each individual's preferences about apps that *never entered*. Models involving monopolistic competition and/or constant elasticity of substitution are regularly used to study aggregate outcomes including aggregate consumer welfare, as in Eaton & Kortum (2002)¹² and Nair et al. (2004), without dealing with the idiosyncratic preferences of millions of buyers.

While some consumers will value variety more than others, taking the aggregate 22% increase in consumer welfare and multiplying it by the individual's actual spending is a reasonable way to estimate individual harm. All economic models must simplify the real world to draw conclusions about the counterfactual one.

¹¹ As demonstrated using formula “=r.damages_All_both!W2*’Exhibit 74’!C8/’Exhibit 74’!C7” in the workpaper, “Damages - Aug 16, 2016-May 31, 2022.xlsx”; see MDL Dkt. 512-11, Benedict Decl. Ex. J, Rysman Dep. Tr. 84:7-19 (testifying about “these multipliers of spending that consumers would obtain either from a price effect or a variety effect or . . . both” that “you could apply . . . to an individual as well”); *id.* 85:6-15 (testifying that “I could see it being reasonable to use my model for . . . applying it to individual spending”).

¹² Jonathan Eaton & Samuel Kortum, *Technology, Geography, and Trade*, 70:5 Econometrica 1741 (2002).